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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/720,430	11/24/2003	Cedric Carlton Lowe	137264	5103

7590

09/20/2005

Steven J. Rosen
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EXAMINER

VERDIER, CHRISTOPHER M

ART UNIT	PAPER NUMBER
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3745

DATE MAILED: 09/20/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No.	Applicant(s)	
	10/720,430	LOWE ET AL.	
	Examiner	Art Unit	
	Christopher Verdier	3745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-6, 10-17 and 20-35 is/are rejected.
- 7) ☒ Claim(s) 7-9, 18 and 19 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>11-24-03</u> . | 6) <input type="checkbox"/> Other: ____. |

Specification

The disclosure is objected to because of the following informalities: Appropriate correction is required.

In paragraph 17, line 2, “2” should be changed to -- 1 --.

In paragraph 18, line 3, “2” should be changed to -- 1 --.

The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required:

Claim 16, which recites at least a first portion of the convection cooling apertures are axially angled forwardly with respect to the axis of rotation, has no antecedent basis in the specification for the underlined limitation.

Claim 20, which recites at least one metering hole disposed through each of the hanger segments and leading to the baffle plenum, has no antecedent basis in the specification for the underlined limitation.

Claim 28, which recites at least a first portion of the convection cooling apertures are axially angled upstream, has no antecedent basis in the specification for the underlined limitation.

Claim 34, which recites at least a first portion of the convection cooling apertures are axially angled upstream, has no antecedent basis in the specification for the underlined limitation.

Examiner's Suggestions to Claim Language

The following are suggestions to improve the clarity and precision of the claims:

In claim 21, line 6, "the" (first occurrence) may be changed to -- a --.

In claim 23, line 6, "the" (first occurrence) may be changed to -- a --.

In claim 26, line 6, "the" (first occurrence) may be changed to -- a --.

In claim 30, line 6, "the" (first occurrence) may be changed to -- a --.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 20-35 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 20, last three lines recite that the asymmetrical densities of aperture inlets are symmetric with respect to the axially extending midlines. This is inaccurate, because as seen in figures 3-4 and as disclosed in the specification (paragraph 27, lines 10-14, for example), the asymmetrical densities of aperture inlets 120 are asymmetric with respect to the axially extending midlines 112.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-6 and 10-17 are rejected under 35 U.S.C. 102(b) as being anticipated by Lee 6,155,778 (figures 1-2 and 4). See the annotated figure at the end of this paragraph. Lee discloses a turbine shroud assembly cooling element 40 comprising an arcuate panel 48 circumscribed about an axis of rotation 12 and having opposite axially spaced apart forward and aft ends 54, 56, a plurality of cooling apertures 64 extending through the panel, an axially extending midline 12 of the panel parallel to the axis of rotation, a symmetric portion A of the cooling apertures having a symmetrical density of aperture inlets that is symmetric with respect to the axially extending midline, and an asymmetric portion B of the cooling apertures having an asymmetrical density of aperture inlets that is asymmetric with respect to the axially extending midline. There is a high density area C of the cooling apertures in the asymmetric portion of the cooling apertures with the high density area having a higher density of aperture inlets than in the symmetric portion of the cooling apertures, and a low density area E of the cooling apertures in the asymmetric portion of the cooling apertures with the low density area having a lower density of aperture inlets than in the symmetric portion of the cooling apertures. (Note that in high density area C of figure 4, there are four cooling apertures 64 adjacent to aft end 56, while in low density area E of figure 4, there are three cooling apertures 64 adjacent to aft end 56). The high density area is located in a wake region of the arcuate panel, because upstream stator vanes 24 cause a wake of the working fluids flow across the entire panel. The cooling element is a shroud segment and the arcuate panel is a base, and the cooling apertures are convection cooling apertures. The high density area of the convection cooling apertures is located in the wake

Art Unit: 3745

region as above. An unnumbered first portion of the convection cooling apertures are axially angled forwardly with respect to the axis of rotation (see figure 2), and an unnumbered second portion of the convection cooling apertures are axially angled rearwardly with respect to the axis of rotation (see figure 2).

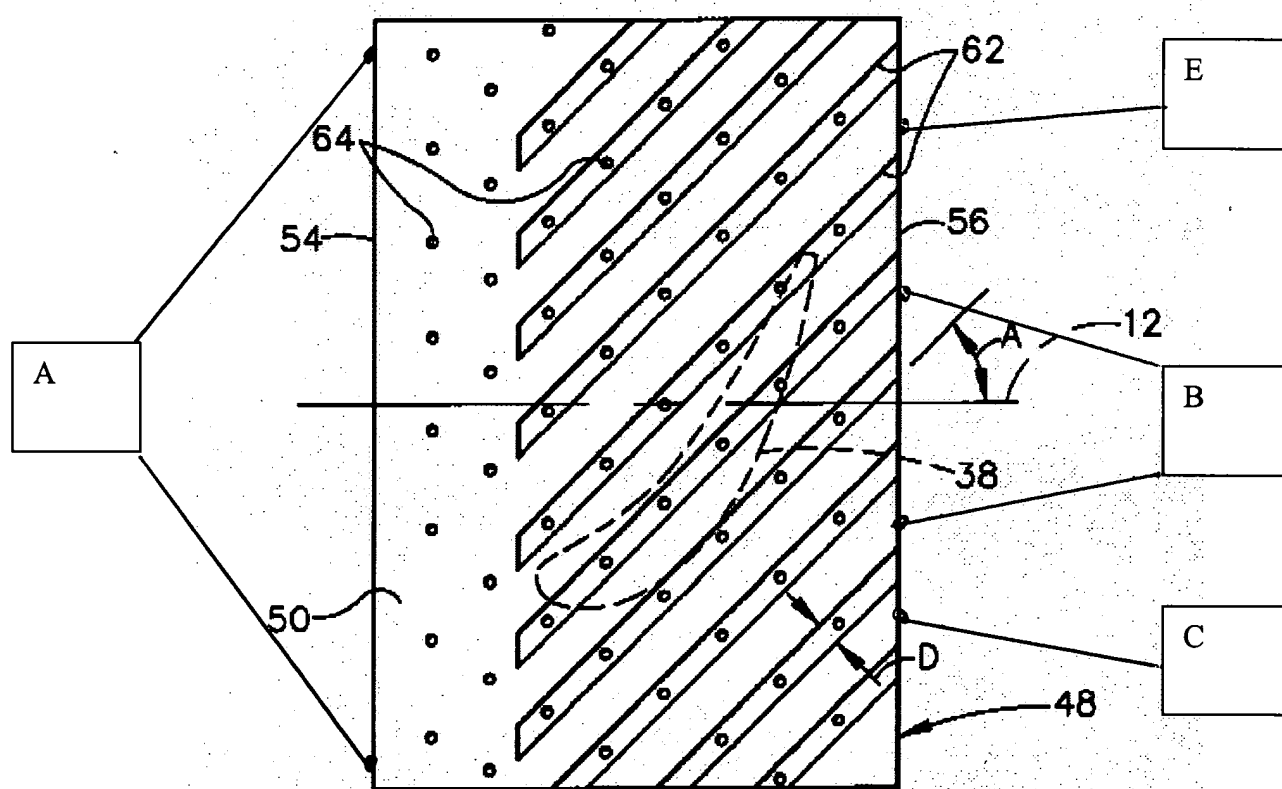


FIG. 4

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 20 and 23-29 (as far as they are definite and understood - assuming “symmetric” in the second to last line of claim 20 to be “asymmetric”) are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee 6,155,778 in view of Proctor 5,169,287. Lee (figures 1-2 and 4, referring to the annotated figure above) discloses a turbine shroud assembly 40 substantially as claimed, comprising a plurality of arcuate shroud segments 48 circumferentially disposed about an engine centerline axis 12, each of the shroud segments including a base having a radially outer back surface, a radially inner front surface, and opposite axially spaced apart upstream and downstream ends 54, 56, a plurality of angled elongated convection cooling apertures 64

Art Unit: 3745

extending through the base with convection aperture inlets at the back surface and aperture outlets at the radially inner front surface, an arcuate hanger 42 supporting the shroud segments and secured to a gas turbine engine outer casing 44, an unnumbered shroud chamber radially disposed between the hanger and bases, an unnumbered metering hole disposed through the hanger, the midline of the base being parallel to the engine centerline axis, and asymmetric portions B of the cooling apertures having asymmetrical densities of aperture inlets that are asymmetric with respect to the axially extending midline. There is a high density area C of the convection cooling apertures in the asymmetric portion of the cooling apertures with the high density area having a higher density of aperture inlets than in a symmetric portion A of the convection cooling apertures, and a low density area E of the convection cooling apertures in the asymmetric portion of the convection cooling apertures with the low density area having a lower density of aperture inlets than in the symmetric portion of the convection cooling apertures.

(Note that in high density area C of figure 4, there are four cooling apertures 64 adjacent to aft end 56, while in low density area E of figure 4, there are three cooling apertures 64 adjacent to aft end 56). The high density area is located in a wake region of the arcuate panel, because upstream stator vanes 24 cause a wake of the working fluids flow across the entire panel. The cooling element is a shroud segment and the arcuate panel is a base, and the cooling apertures are convection cooling apertures. The high density area of the convection cooling apertures is located in the wake region as above. An unnumbered first portion of the convection cooling apertures are axially angled forwardly with respect to the axis of rotation (see figure 2), and an unnumbered second portion of the convection cooling apertures are axially angled downstream (see figure 2).

However, Lee does not disclose that hanger 42 is segmented, and does not disclose a pan-shaped baffle radially disposed in the shroud chamber between each of the hanger segments and bases and defining a baffle plenum in the shroud chamber and radially outwardly of the baffle, with a metering hole through each of the hanger segments and leading to the baffle plenum, with a plurality of impingement apertures having impingement aperture inlets through a panel of the baffle and generally oriented towards the base, the panel being radially spaced apart from and generally concentric with the base, and does not disclose parallel axially extending midlines of the panel and the base, with the midline of the panel being parallel to the engine centerline axis

Proctor '287 (figure 1) shows a turbine shroud assembly having a hanger 24 that is segmented, with a pan-shaped baffle 68 radially disposed in an unnumbered shroud chamber between each of the hanger segments and bases 44 of shroud segments 22 and defining a baffle plenum 72 in the shroud chamber and radially outwardly of the baffle, with a metering hole 76 through each of the hanger segments and leading to the baffle plenum, with a plurality of impingement apertures 78, 78a having impingement aperture inlets through a panel of the baffle and generally oriented towards the base, the panel being radially spaced apart from and generally concentric with the base, with parallel axially extending midlines of the panel and the base, with the midline of the panel being parallel to the engine centerline axis, for the purposes of accommodating for thermal expansion and contraction of the hanger segments, and providing impingement cooling to the shroud segments.

Art Unit: 3745

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to form the turbine shroud assembly of Lee such that hanger 42 is segmented, and to provide a pan-shaped baffle radially disposed in the shroud chamber between each of the hanger segments and bases and defining a baffle plenum in the shroud chamber and radially outwardly of the baffle, with a metering hole through each of the hanger segments and leading to the baffle plenum, with a plurality of impingement apertures having impingement aperture inlets through a panel of the baffle and generally oriented towards the base, the panel being radially spaced apart from and generally concentric with the base, with parallel axially extending midlines of the panel and the base, with the midline of the panel being parallel to the engine centerline axis, as taught by Proctor, for the purposes of accommodating for thermal expansion and contraction of the hanger segments, and providing impingement cooling to the shroud segments.

Allowable Subject Matter

Claims 7-9 and 18-19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 21-22 and 30-35 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

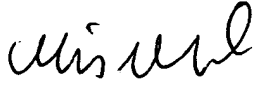
Art Unit: 3745

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher Verdier whose telephone number is (571) 272-4824. The examiner can normally be reached on Monday-Friday from 10:00-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward K. Look can be reached on (571) 272-4820. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

C.V.
September 15, 2005


Christopher Verdier
Primary Examiner
Art Unit 3745